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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/714,214	11/14/2003	Joseph John Sumakeris	5308-223CT	2561
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MYERS BIGEL SIBLEY & SAJOVEC			EXAMINER	
PO BOX 37428			DHINGRA, RAKESH KUMAR	
RALEIGH, NC 27627			ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Office Action Summary	Application No. 10/714,214	Applicant(s) SUMAKERIS ET AL.	
	Examiner Rakesh K. Dhingra	Art Unit 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 February 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 6/19/06 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

Applicant has amended claims 1, 3, 4. Further, claim 5 is now the only independent claim.

Claims 1-12 are pending and active.

Applicant's arguments with respect to claims 1-12 have been considered and response is given hereunder.

Applicant has argued that in Leycuras reference, duct 6 is not a susceptor and further there is no apparent suggestion to use duct 6 as a susceptor and thus the coating referred to in the last office action is not coating on the susceptor.

Examiner responds that in Leycuras reference, duct 6 is used to transfer heat to substrate 10, that is "it absorbs externally supplied energy and re-transmits the same to a substrate" and is thus functioning as a susceptor. Further, Leycuras also teach that heating means can be inductive heating means, and thus duct 6 functioning as a susceptor could be heated by induction means as per claim limitations. Further, Therefore teaching by Leycuras that internal faces of walls 37-40 of duct 6 (susceptor) can be coated also meets claim limitation in this respect. Thus Leycuras teaches all claim limitations of claim 5 except that second material of susceptor (that is coating material) is elected from the group consisting of refractory metal carbides.

However, applicant's argument that base plate 17 of Holzlein is located between outer container 21 and coating 20, as against, in between the coating and the processing chamber, as per claim limitation is considered and found persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in over Leycuras in view of Rupp et al (US Patent No. 6,740,167), since combination of these two references meets claim 5 limitations. Accordingly claim 5 has been rejected under 35 USC 103 (a) as explained below. Further, remaining claims 1-4, 6-12 have also been rejected under 35 USC 103 (a) as explained below.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 2, 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leycuras (US Patent No. 6,709,520) in view of Rupp et al (US Patent No. 6,740,167).

Regarding Claims 5-7, 1: Leycuras teaches an apparatus (Figures 1-5) that includes a housing assembly for an induction heating device, the housing assembly defining a processing chamber 2 and comprising:

a) a duct (susceptor) 6 surrounding at least a portion of the processing chamber; and

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b) a secondary duct (thermally conductive liner) 70 interposed between the duct (susceptor) 6 and the processing chamber, wherein the secondary duct (liner) 70 is separately formed from the duct (susceptor) 6;

c) the inner surface of susceptor walls 37, 38 can be coated (that is susceptor would have a core material and a coating material). Thus the liner 70 will be disposed between the susceptor coating and the processing chamber;

d) the secondary duct (liner) 70 is removable from the susceptor without requiring disassembly of the duct (susceptor) 6; and

e) the duct (susceptor) 6 is made of graphite (core material) [column 3, line 30- column 7, line 25 and column 8, line 62 to column 10, line 5].

Leycuras does not explicitly teach that coating (second material) is made from refractory metal carbides.

Rupp et al teach an apparatus (Figures 1-4) for processing wafers comprising a susceptor 1 that has an insert 2 for supporting a semiconductor substrate 3. Rupp et al further teach that insert 2 has a core 11 made from graphite, and it is then coated with a metal carbide layer 6 made from metals like tantalum, niobium etc (refractory metals) [column 2, line 35 to column 3, line 20 and column 4, line 45 to column 5, line 52].

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a susceptor with a graphite core material and coated with a carbide coating of refractory metals like TaC, as taught by Rupp et al in the apparatus of Leycuras to obtain susceptor that is stable at high temperatures and also does not introduce any impurity into the wafer during processing (column 5, lines 2-17).

Regarding Claim 2: Leycuras teaches that apparatus comprises:

lower and upper walls (a first susceptor portion and a second susceptor portion) 37, 38 disposed on opposed sides of the processing chamber;

a secondary duct (first liner) 70 disposed between the first susceptor portion and the processing chamber; and

another secondary duct (second liner) 70 disposed between the second susceptor portion and the processing chamber (Figure 5 and column 9, line 62 to column 10, line 5).

Claims 3, 8, 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leycuras (US Patent No. 6,709,520) in view of Rupp et al (US Patent No. 6,740,167) as applied to claim 5 and further in view of Berkman et al (US Patent No. 3,845,738).

Regarding Claim 3: Leycuras in view of Rupp et al teaches all limitations of the claim (as explained above under claim 5) including that the duct (susceptor) 6 includes a platter region (portion underlying the substrate holder 29) and a substrate holder (platter) 29 adapted to support the wafer 10 and overlying the platter region (Figure 1).

Leycuras in view of Rupp et al does not teach an opening in the liner and overlying the platter region.

Berkman et al teach an apparatus (Figure 3) that includes a susceptor 72 with a shield (liner) 74 and wherein the shield (liner) 74 has plurality of openings 80, 82 that lie over a platter region (portion lying within the openings) of susceptor 72 (column 4, lines 13-45).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a liner with opening as taught by Berkman et al in the apparatus of Leycuras in view of Rupp et al to enable accommodate wafers surrounded by the heat shield (liner) and to minimize deposition of reaction products on the susceptor surface (column 1, lines 15-65).

Regarding Claim 8: Berkman et al teach that platter region is exposed through the openings 80, 82 in the shield (liner) [Figure 3].

Regarding Claim 9: Berkman et al teach raised portions 84, 86 (like platters) disposed within the openings 80, 82 in the shield (liner) 74 [column 4, lines 13-40].

Claims 4 & 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Leycuras (US Patent No. 6,709,520) in view of Rupp et al (US Patent No. 6,740,167) as applied to claim 5 and further in view of Glass (US Patent No. 5,667,587).

Regarding Claim 4: Leycuras in view of Rupp et al teaches all limitations of the claim (as explained above under claim 5) including a liner 70 that is formed separately from the susceptor.

Leycuras in view of Rupp et al does not teach that liner varies in thickness along at least a portion of its length.

Glass et al teaches an apparatus (Figures 2-5) that includes a growth cavity 32 with a liner 36. Glass et al further teaches that liner 36 can have variable thickness along its length (Figure 5 and column 2, line 20 to column 3, line 30).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a liner with variable thickness as taught by Glass et al in the apparatus of Leycuras in view of Rupp et al to enable obtain variable heating means in the process chamber.

Regarding Claim 11: Leycuras teaches that liner (secondary duct) 70 is in contact with duct (susceptor) 6 (Figure 5).

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Leycuras (US Patent No. 6,709,520) in view of Rupp et al (US Patent No. 6,740,167) and Berkman et al (US Patent No. 3,845,738) as applied to Claim 3 and further in view of Paisley et al (US Patent No. 6,569,250).

Regarding Claim 10: Leycuras in view of Rupp et al and Berkman et al teaches all limitations of the claim except that platter is adapted to rotate relative to susceptor.

Paisley et al teach an apparatus (Figure 1) that includes a base portion (base of susceptor) 150 and a platter 130 that is adapted to rotate relative to susceptor base 150 (column 4, line 13 to column 6, line 5). Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a platter that is adapted to rotate relative to susceptor as taught by Paisley et al in the apparatus of Leycuras in view of Rupp et al and Berkman to improve uniformity of deposition layers (column 1, lines 25-35).

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Leycuras (US Patent No. 6,709,520) in view of Rupp et al (US Patent No. 6,740,167) as applied to Claim 5 and further in view of Mezey (US PG PUB 2001/0046768).

Regarding Claim 12: Leycuras in view of Rupp et al teaches all limitations of the claim including that liner 70 is formed from refractory material like graphite (column 5, lines 1-15).

Leycuras in view of Rupp et al does not explicitly teach that liner is made from silicon carbide.

Mezey teaches an apparatus for semiconductor processing (Figure 1) comprising:

A housing 30 defining a processing chamber and a heat shield 70 (liner) that interfaces with the processing chamber and is made from silicon carbide (paragraphs 0033-0050).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use liner made from silicon carbide as taught by Mezey in the apparatus of Leycuras in view of its being an equivalent refractory material.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rakesh Dhingra



Parviz Hassanzadeh
Supervisory Patent Examiner
Art Unit 1763